In the Claims

Applicants have submitted a new complete claim set showing marked up claims with insertions indicated by underlining and deletions indicated by strikeouts and/or double bracketing.

Please amend claim 1 and add new claim 25 as noted below.

1. (Currently Amended) A method for determining velocity of an elongated polymer <u>through a device</u>, the method comprising:

defining at least one detectable region on the polymer;

causing relative movement of the elongated polymer through a plurality of linearly sequential detection zones <u>of a device</u>, each separated a predetermined distance, to cause interactions between the detectable region and the detection zones, thereby producing a plurality of signal amplitude profiles, each signal amplitude profile being produced at a different detection zone and comprising data acquired before, during and after each interaction;

measuring each of the signal amplitude profiles in a time-correlated manner; and analyzing the time-correlated measurements to determine the velocity of the polymer.

2. (Original) The method of claim 1, wherein the plurality of linearly sequential detection zones comprises a first detection zone and a second detection zone.

3. (Original) The method of claim 2, wherein a first signal amplitude profile is measured at the first detection zone and a second signal amplitude profile is measured at the second detection zone.

4. (Original) The method of claim 3, wherein each signal amplitude profile has a center-of-mass, a contour center, a leading edge, and a leading-edge-rise-time.

5. (Original) The method of claim 4, wherein the velocity of the elongated polymer is a center-of-mass velocity determined by the steps of:

determining the time interval between detection of the center-of-mass in the first signal amplitude profile and the center-of-mass in the second signal amplitude profile; and

dividing the predetermined distance between the detection zones by the time interval.

6. (Original) The method of claim 4, wherein the velocity of the elongated polymer is a center-to-center velocity determined by the steps of:

determining the time interval between detection of the contour center of the first signal amplitude profile and the contour center of the second signal amplitude profile; and

dividing the predetermined distance between the detection zones by the time interval.

7. (Original) The method of claim 4, wherein the velocity of the elongated polymer is an edge-to-edge velocity determined by the steps of:

determining the time interval between detection of the leading edge of the first signal amplitude profile and the leading edge of the second signal amplitude profile; and

dividing the predetermined distance between the detection zones by the time interval.

8. (Original) The method of claim 4, wherein the velocity of the elongated polymer is a rise time velocity determined by the steps of:

determining the time interval between detection of the leading-edge-rise-time in the first signal amplitude profile and the leading-edge-rise-time in the second signal amplitude profile; and

dividing the predetermined distance between the detection zones by the time interval.

9. (Original) The method of claim 1 wherein the detectable region is intrinsically detectable.

10. (Original) The method of claim 1 wherein the detectable region is extrinsically detectable.

11. (Original) The method of claim 1 wherein the detectable region is detected by measurement of a physical quantity selected from a group comprising of electromagnetic radiation, electrical conductance, thermal conductance, and radioactivity.

12. (Original) The method of claim 1 wherein the detectable region is detected by direct or indirect measurement of fluorescent radiation.

13. (Original) A method for determining the length of an elongated polymer, the method comprising:

defining a detectable region along the entire length of the polymer;

causing relative movement of the elongated polymer through first and second detection zones, the zones being linearly spaced apart by a predetermined distance;

measuring a time interval between detection of the elongated polymer at the first detection zone and detection of the elongated polymer at the second detection zone;

dividing the predetermined distance between the first and second detection zones by the time interval of step c) to determine the velocity of the polymer;

measuring, at one of the detection zones, a time interval during which the polymer is detected; and

multiplying the velocity of step d) by the time interval of step e) to determine the length of the elongated polymer.

14. (Original) A method for determining the distance between first and second landmarks on an elongated polymer, the method comprising:

providing first and second landmarks on an elongated polymer;

causing relative movement of the elongated polymer through first and second detection zones, the zones being linearly spaced apart by a predetermined distance, to cause detection of the first and second landmarks at the first detection zone and detection of the first and second landmarks at the second detection zone;

measuring the time interval between detection of one landmark at the first detection zone and detection of that same landmark at the second detection zone;

dividing the predetermined distance between the first and second detection zones by the time interval of step c) to determine the velocity of the polymer;

measuring the time interval between detection of the first landmark at one detection zone and detection of the second landmark at that same detection zone; and

multiplying the velocity of step d) by the time interval of step e) to determine the distance between the first and second landmarks.

15. (Original) The method of claim 1, wherein the elongated polymer comprises an elongated DNA molecule.

16. (Original) The method of claim 13, wherein the elongated polymer comprises an elongated DNA molecule.

17. (Original) The method of claim 14, wherein the elongated polymer comprises an elongated DNA molecule.

18. (Original) The method of claim 1, wherein the elongated polymer includes fluorescent labels, and further wherein the measurements are measurements of fluorescence intensity.

19. (Original) The method of claim 13, wherein the elongated polymer includes fluorescent labels, and further wherein detection of the elongated polymer comprises detection of fluorescent energy.

20. (Original) The method of claim 14, wherein each of the landmarks comprises a fluorescent label, and further wherein detection of the landmarks comprises detection of fluorescent energy.

21. (Original) The method of claim 20, wherein the first landmark is labeled with a first fluorescent tag and the second landmark is labeled with a second fluorescent tag, and further wherein the first and second fluorescent tags emit fluorescent energy at different and distinguishable wavelengths.

22. (Original) The method of claim 1, wherein the detection zones are positioned along an elongation channel through which the polymer is caused to travel.

23. (Original) The method of claim 13, wherein the detection zones are positioned along an elongation channel through which the polymer is caused to travel.

24. (Original) The method of claim 14, wherein the detection zones are positioned along an elongation channel through which the polymer is caused to travel.

25. (New) A method for determining velocity of an elongated polymer, the method comprising:

defining at least one detectable region on the polymer;

causing relative movement of the elongated polymer by an effect other than electrophoresis, to move the elongated polymer through a plurality of linearly sequential detection zones, each separated a predetermined distance, to cause interactions between the detectable region and the detection zones, thereby producing a plurality of signal amplitude profiles, each signal amplitude profile being produced at a different detection zone and comprising data acquired before, during and after each interaction;

measuring each of the signal amplitude profiles in a time-correlated manner;
analyzing the time-correlated measurements to determine the velocity of the polymer.